

ception along the interface between these masses, were unusually frequent. Others moved intact across the ocean from the region west of the 180th meridian, but followed a more southerly path than normal. The processes involved in the formation of these cyclones were not changed but the place of origin was and this was an important factor in the cause of heavy rains in the Pacific Northwest. By virtue of their development in lower latitudes these depressions had easier access to a larger supply of warmer, moister air and their forward portions were heavily laden with water vapor. The Pacific Northwest was usually within the path of the heavily

moisture-laden sectors of cyclones and too, the rainfall was increased by the effect of forced ascent of the strong, moist, southerly winds by the mountains. At the close of the month one of these disturbances moved south-eastward with the result that large amounts of warm, moist air were transported to southern California and the area around and immediately to the north and west of Los Angeles received record-breaking rains. Again, the forced ascent of the moist winds by the sharp increase in elevation of that area back from the coast intensified what otherwise might have been unusual rains but not quite so heavy as occurred.

AN UNUSUAL SOLAR HALO AT PORTLAND, OREG., FEBRUARY 15, 1934

By W. H. WOODWARD

[Weather Bureau office, Portland, Oreg., February 1934]

An unusually brilliant display of solar halos was observed at Portland, Oreg., between 7:50 a.m. and 8:55 a.m. February 15, 1934, on which date the sunrise was at 7:14 a.m. These refraction phenomena were of unusual interest for two reasons. First, the circumzenithal arc remained of nearly constant form and brilliancy from the time it was first witnessed at 8:20 a.m. until it vanished at 8:50 a.m. This period of 30 minutes during which this phenomenon was visible is quite unusual. W. J. Humphreys in "Physics of the Air", and Louis Besson in "The Different Forms of Halos and Their Observation", mention that this phenomenon does not long remain visible, 5 minutes on the average. This circumzenithal arc, approximately 60° long, was very brilliantly colored and like an exceptionally bright rainbow. Second, during the time of the year when there are cirrus clouds at Portland, the witnessing of solar halos usually is impossible on account of the prevailing lower clouds.

The other refraction phenomena witnessed during this time were: A quarter arc of the great halo of 46°; two short arcs of the halo of 22°, which at times were bright and of such width as to be in juxtaposition with the ordinary parhelia of 22°; and, the upper tangent arc of the halo of 22°. At 7:50 a.m. a bright halo of 22° formed in juxtaposition with the ordinary parhelia of 22°, and simultaneously a brilliant upper tangent arc developed. These halos were clear in color—red toward the sun to violet, inclusive—and remained visible with changeable hue until about 8:45 a.m. At 8:20 a.m. the lower portion of the great halo of 46° and the circumzenithal arc were observed to appear at approximately the same time. Fifteen minutes later, the arc of the great halo of 46° extended from the level of the sun to the circumzenithal arc, to which it was tangent. This great halo arc remained of constant form, brilliantly colored, resembling a secondary rainbow in depth of color, and did not fade until 8:50 a.m.

TORNADOES IN LAUDERDALE COUNTY, MISS., SUNDAY, FEBRUARY 25, 1934

By E. E. UNGER

[Weather Bureau office, Meridian, Miss., Mar. 8, 1934]

The weather map of Sunday morning, February 25, 1934, showed a crescent low extending from Utah south-eastward through Texas and thence northeastward to the lower Ohio Valley with separate centers over western Colorado, extreme southern Texas, and southwestern Arkansas, while a large area of high barometric pressure, crested over Alberta and Saskatchewan, was pushing its way southward over the Plains States attended by a cold wave and fresh to strong winds as far south as the Texas Panhandle and Oklahoma. The temperatures that morning were as low as 14° at Amarillo, Tex., while temperatures of 60° or more prevailed over southern and eastern Texas, Louisiana, and central and southern Mississippi. Every indication pointed to a rapid northeastward movement of the low and an equally rapid southward movement of the high with its attendant cold wave. Thus the stage was set for a stormy Sunday over eastern Mississippi with rain, hail, thunderstorms, squall winds, and a generally turbulent condition.

The weather conditions prevailing through Sunday, February 25, in Lauderdale County, Miss., of which Meridian is the county seat, were cloudy and somewhat unsettled with mild temperatures at 7 a.m., followed by a slight breaking away of the clouds and a little sunshine in mid-forenoon, after which time the clouds became thicker. From about noon to nightfall the cloud blanket

was so heavy, with clouds moving rapidly from the southwest, that the use of lights indoors was necessary if one wished to read or write. The first rain began at Meridian at 10:55 a.m. and the first thunder was heard at 11:55 a.m. Intermittent showers prevailed at Meridian to 3 p.m., heavy rain from 3 p.m. to 4:45 p.m., followed by moderate and then light rain to 8:15 p.m. Light hail, stones about the size of large sized peas, accompanied the heavy rain from 3:09 p.m. to 3:17 p.m. The wind, more or less variable with increasing gustiness, was generally from the southwest from 7 a.m. to 3:20 p.m. after which it shifted through west to north at 3:50 p.m., then to northeast between 5 and 6 p.m., then more or less variable but generally southeast till after 10 p.m., when the prevailing direction became northwest or west and the temperatures of the incoming cold wave first became noticeable. During the period of heavy rainfall, the winds were more or less squally, with a maximum velocity (true) of 28 miles per hour from the SW at 3:12 p.m. and an extreme of 37 miles per hour at 3:14 p.m. Although the data given in this paragraph are taken from the records of the Weather Bureau office at Meridian, yet from information obtained from interviews with a number of persons, the weather conditions prevailing throughout this and surrounding counties on Sunday, February 25, were very similar as to cloudiness, rain,

hail, thunderstorms, squall winds, and a generally turbulent state. Light hail was reported from a number of localities in this county as well as from the two tornado zones.

The barograph trace at the Weather Bureau office at Meridian showed a rapid but steady fall of 0.30 inch in a little over 6 hours from 29.85 inches at 8:30 a.m. to 29.55 inches at 2:50 p.m., after which the barometer began rising. Its rise was very unsteady with marked fluctuations to 6 p.m. and moderate fluctuations till after 2 a.m. of February 26. Although only light to moderate thunder continued throughout the afternoon and evening to about 9 p.m., yet as indicated on the barograph trace of that date, a gusty squally condition prevailed, especially between the hours of 3 and 5 p.m.

While these conditions were general over this section of Mississippi Sunday afternoon, February 25, two destructive tornadoes occurred in Lauderdale County, one about 13 miles to the north of Meridian in the Center Hill-Obadiah-Daleville community and the other about 13 miles east-southeast of Meridian in the Purvis-Alamucha-Kewanee community. It is believed, however, from the scattered damage reported in other sections in and about Meridian and in view of the turbulent atmospheric conditions prevailing generally in this territory on that day, that other small local storms, probably approaching tornado characteristics, may have occurred.

The writer visited the Center Hill-Obadiah-Daleville community the day following the storm to obtain first-hand information, and in addition to inspecting the path cut by this tornado and the damage resulting therefrom, a considerable number of persons, nearly all of whom were eyewitnesses of the storm, were interviewed. The Purvis-Alamucha-Kewanee district was not visited, but from information obtained through an interview with an eyewitness, and from press dispatches, there seems to be little doubt but that the tornado in the southeastern portion of the county was just as intense as the storm in the northern portion.

The Center Hill-Obadiah-Daleville tornado was observed from an excellent vantage point from his home located on a hilltop in the Center Hill community by C. L. Pace. Mr. Pace stated that about 15 minutes before the funnel-shaped cloud passed, he noticed the clouds to the south, southwest, and west were very black and greatly disturbed when it appeared as though two of the cloud masses were being drawn together as though by suction. About 5 to 7 minutes before the storm passed, the sound of distant roaring similar to the noise produced by the approach of a long freight train on a still night was first noticed and about the same time the pendent cloud was observed to the southwest moving toward the observer, the pendent seeming to extend downward into a mist-like roll or ball-shaped cloud on the ground. Realizing that a tornado was approaching, Mr. Pace and those with him were about to seek refuge in a gully near the house when they noticed that the storm would pass some distance to the eastward. He said he watched the storm as long as it was visible and that it moved rather slowly, the lower portion "bouncing along the ground." This rising and falling of the pendent cloud is indicated by the damage to trees. At some places in the path, destruction is complete; at other places just the tree tops are splintered and broken; still at other places there seems to be no effect of the storm at all except scattered debris which was apparently dropped from the funnel cloud as it passed overhead. As the storm passed, it produced a deafening roar. In describing the action of the storm as it passed over the J. H. Downey barn, Mr. Pace said the

barn seemed to be enveloped in a cloud of dust and mist and immediately the air over the place where the barn had stood was full of debris flying in all directions "as though a great flock of large birds, suddenly frightened, had flown into the air." When the cloud had passed, the Downey barn was no longer there, but debris could be seen falling as the storm swept on.

This tornado continued moving in a northeasterly direction from the Center Hill community through the northwest portion of the Obadiah community 1½ miles, or so, northwest of the schoolhouse, passed one fourth mile south of Daleville and spent itself a mile or two beyond the Meridian-Daleville highway. The total length of the path was about 10 miles. Where evidences of this tornado were visible the path of complete destruction was not more than 600 to 700 feet across, while its total width, including the strips of partial destruction on either side, was from 1,000 to 1,200 feet.

The tornado was first observed by Mr. Pace about 2:35 p.m. southwest of the Center Hill community, and last seen passing Daleville at approximately 2:50 p.m. Intermittent thundershowers had prevailed along the path of the disturbance and in the surrounding communities prior to the tornado but the rainfall had been light. Little or no rain fell as the storm was passing but some reported a little hail falling just previously, while others reported some light hail immediately afterward. Heavy rains occurred in the communities through which the tornado passed immediately after it went by. The wind just prior to the storm was very light. No lightning in connection with this storm was seen.

The Calvert home located on a plot of high ground in the Center Hill community was one of the first buildings struck. There were no trees in the immediate proximity of the home to give evidence of the edge of the storm path but apparently the building was lifted bodily from its creosoted log footings and carried backward about 25 feet where one corner of the house must have struck the ground and then hurled forward across the road, over or through the tree tops of a wooded slope to the opposite face of a small valley, probably 400 feet from where it had stood, and where the debris of the house and the bodies of its occupants were scattered over a field. Mr. Carl Calvert, his wife, and 4 of their 5 small children were in the house at the time and all were found dead when the storm had passed. This would indicate that the northern edge of the vortex of the pendent cloud passed over this home thus carrying it first backward and at least part way around the vortex. The chimney of the house fell toward the south. A large pile of kindling wood and a barrel beside the house seemed quite undisturbed.

Robert McKee and Mr. and Mrs. Tom Richardson sought shelter in a ditch near the Richardson home and about 100 yards from the Carl Calvert home when they noticed the tornado approaching. In an interview with Mr. McKee he said: "The cyclone must have passed over us just a few minutes after we got into the ditch and probably was not over us more than a minute, but it seems to me that during that period of time I lived 500 years. The center of the storm (vortex) passed within 40 feet of where I was lying, and as it went by I looked up and it was black as night. It seemed to be a tarlike substance rather than just air. In the ditch where I was lying, there was very little wind. It is impossible to describe the noise of the storm but it seemed to me like all the noises of hell combined attended this tornado, and after its passage the contrasting (apparent) silence which followed immediately seemed equally awesome and un-

canny, as though a tremendous peace had settled on the earth. During the storm a piece of timber hit and fractured my shoulder, but at no time was I unconscious. Even now, although the storm occurred 10 days ago, I still have the impression that I was in hell and have returned to earth."

A second storm of considerably less intensity passed over the Center Hill community about 3:30 p.m., damaging a gable of the Center Hill school, blowing down a number of small buildings and a barn, the latter belonging to A. W. Hanson, killing a number of his cattle and injuring others. This storm moved from the west toward the east although not believed to be a fully formed tornado.

At the Daleville end of the tornado path, the D. E. Harbour home, a two-story frame structure was left standing though damaged to such an extent that it must be torn down before it can be rebuilt. The pendent cloud did not pass directly over this house but probably about 100 feet to the southeast of it. The front or east side and the south side of the main part of the house were completely blown out and a large portion of the roof destroyed while the building was drawn over toward the south about 15° from the perpendicular.

The home of Jean Gordon, a Negro, was destroyed by the storm—the roof was blown away and the house bowled over. His wife and their five children were indoors at the time. One of the children, a boy about 6 years of age, frightened by the roar of the storm which was about to strike, started to run out. He got as far as the outside edge of the porch when the wind blew him back into the house. In the meantime a 9-months-old baby was blown from its bed across the room into an empty fireplace, a distance of probably 10 feet. Bricks and timbers fell all around the baby as well as the mother and her other children, but none was even slightly scratched.

The home of Algie White near Daleville was completely destroyed and most of this home and the furnishings were carried away when the pendent cloud passed over it. Mr. White and his family were away for the day. One of the many pranks played by the storm occurred at this place. A small stand was left undamaged and as it had stood before the storm, with a lamp on it with the chimney unbroken, and beside the lamp a memorandum book, though all had been soaked by the rain following the tornado.

The Purvis-Alamucha-Kewanee tornado apparently started on or near the Lauderdale-Clarke County line in the Purvis community at about 2:55 p.m. and traveled northeastward for about 16 miles to a point on or near the Mississippi-Alabama line about 2 miles southeast of Kewanee. This storm was witnessed by a number of persons. W. L. Smith, the city salesman for the Standard Oil Co. at Meridian, described the Purvis-Alamucha-

Kewanee tornado in detail to the writer. Mr. Smith was sitting with his family and parents in the living room of his home at Increase on Sunday afternoon, February 25, when they became conscious of a peculiar rumbling sound. They all rushed to a window and saw a funnel-shaped cloud apparently moving toward them, and then they hurried from the house with the intention of all seeking refuge in a flower pit in the yard. However, when they reached the outside they noticed that the pendent cloud would pass some distance to the northwest of them. This tornado was first noticed and the noise first heard by Mr. Smith and his family at about 2:57 p.m. It passed approximately 1 mile to the northwest at 3:02 p.m. and was last observed moving northeastward at 3:08 p.m. The storm seemed to be moving slowly, probably 25 to 30 miles per hour. Due to the fact that the Smith home is not located on elevated ground and is in a more or less wooded section, it was impossible for them to see the portion of the pendent cloud close to the ground, but the remainder of it could be clearly seen. In describing the storm, Mr. Smith stated that thunder-showers and some wind, more or less gusty, had been in progress during the early afternoon and that occasionally the sky looked very threatening, though when the storm was first sighted and during its passage there was no rain falling and the air nearly calm, though the path was only a mile away. A heavy downpour of rain occurred immediately after the tornado had passed and some hail, about the size of peas, fell for a minute or two immediately preceding the passage. There was a noticeable drop in temperature about 30 minutes later. Continuous sheet lightning was observed in the top and immediately following the pendent cloud, giving the effect of a greenish-white glow, and the clouds to the rear of the storm seemed to rush inward as the funnel passed as though filling a vacuum. The path of the storm near Increase was about 400 to 500 feet wide. As the tornado went through Bucatunna Swamp after passing Increase, Mr. Smith observed what he thought to be large tree tops well up in the funnel cloud being thrown out. The country through which this Purvis-Alamucha-Kewanee tornado passed is rather thinly settled and consists mostly of wood and swamp land. This storm killed a white boy and a Negro in the Purvis community, a Negro in the Salem community, and Mr. Curtis Bishop and Mr. Martin Brown near Kewanee. Mrs. Curtis Bishop died 2 days later from injuries received in the storm.

The total number of persons killed by these 2 tornadoes was 12, 1 dying 2 days after the storm from injuries received in it. About 20 other persons were seriously injured, while some 15 to 20 received minor injuries. Twenty-five buildings were completely destroyed, and 19 others damaged.

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C. FITZHUGH TALMAN, *in charge of Library*

RECENT ADDITIONS

The following have been selected from among the titles of books recently received as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies:

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